

CLAIMS

1. A composition comprising a mixture of:

(a) a hydrolyzable perfluoropolyetherisocyanate derived silane or a mixture thereof comprising the reaction product of:

5 (i) a fluorinated polyether compound of the formula



wherein R_f is a monovalent or divalent polyfluoropolyether group; Q and Q' are independently a chemical bond, a divalent organic linking group or a trivalent organic linking group; T and T' each independently represent -NCO or an isocyanate reactive group; 10 k' is an integer from 0 to about 10; k is an integer from 1 to about 10; and y is 0 or 1; and

(ii) a silane compound of the formula



15 wherein T'' is -NCO or an isocyanate reactive group; Q'' is an organic divalent linking group; R is an alkyl group of 1-4 carbon atoms; Y is a hydrolyzable group; and x is 0, 1 or 2;

and wherein at least one of T, T' or T'' is -NCO;

20 (b) at least one non-fluorinated compound of an element M from groups III to V of the Periodic Table and having at least two hydrolysable groups; and

25 (c) optionally, at least one non-fluorinated compound of an element M from groups III to V of the Periodic Table having two or three hydrolysable groups; a C_3 - C_{20} hydrocarbon group, a reactive functional group or a mixture thereof.

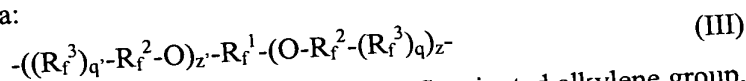
2. A composition according to claim 1, further comprising an organic solvent.

30 3. A composition according to claim 2, wherein said organic solvent comprises a solvent capable of dissolving at least 0.01% by weight of component (a).

4. A composition according to claim 2, wherein said organic solvent is an alcohol, ketone, ether or ester.

5. A composition according to claim 1, wherein the isocyanate reactive group in component (a) is selected from the group consisting of $-\text{CO}_2\text{R}^3$, where R^3 is hydrogen or hydroxyalkyl, $-\text{C}(\text{O})\text{N}(\text{R}^1)(\text{R}^2)$, where R^1 and R^2 are independently hydrogen, hydroxyalkyl or polyalkylenepolyamine; $-\text{OH}$, $-\text{SH}$, and NHR .

6. A composition according to claim 1, wherein R_f in Formula (I) is of the formula:



wherein R_f^1 is a perfluorinated alkyl or a perfluorinated alkylene group, R_f^2 is a perfluorinated polyalkyleneoxy group consisting of perfluorinated alkyleneoxy groups having 1, 2, 3 or 4 carbon atoms or a mixture of such perfluorinated alkyleneoxy groups; R_f^3 is a perfluorinated alkylene group or a substituted perfluorinated alkyl group; q and q' are independently chosen from 0 or 1; z is from 4 to 30, and z' is 0 to 30.

7. A composition according to claim 5, wherein R_f^2 comprises repeating units selected from the group consisting of $-(\text{C}_n\text{F}_{2n}\text{O})-$, $-(\text{CF}(\text{Z})\text{O})-$, $-(\text{C}_n\text{F}_{2n}\text{CF}(\text{Z})\text{O})-$, and $-(\text{CF}_2\text{CF}(\text{Z})\text{O})-$, and combinations thereof, wherein n is at least 1 and wherein Z is a fluorine atom, a perfluoroalkyl group, a substituted perfluoroalkyl group, an oxygen-substituted perfluoroalkyl group, a perfluoroalkoxy group, or an oxygen-substituted perfluoroalkoxy group.

8. A composition according to claim 5, wherein R_f^3 comprises repeating units selected from the group consisting of $-(\text{C}_n\text{F}_{2n})-$ and $-(\text{CF}(\text{Z}))-$, and combinations thereof, wherein n is at least 1 and wherein Z is a fluorine atom, a perfluoroalkyl group, a substituted perfluoroalkyl group, an oxygen-substituted perfluoroalkyl group, a perfluoroalkoxy group, or an oxygen-substituted perfluoroalkoxy group.

9. A composition according to claim 1, wherein R_f is $-\text{CF}_2\text{O}(\text{CF}_2\text{O})_m(\text{C}_2\text{F}_4\text{O})_p\text{CF}_2-$, $-\text{CF}_2\text{O}(\text{C}_2\text{F}_4\text{O})_p\text{CF}_2-$,

-CF(CF₃)(OCF₂(CF₃)CF)_pO(CF₂)_mO(CF(CF₃)CF₂O)_pCF(CF₃)-, or combinations thereof, where an average value for m and p is 0 to 50 and m and p are not each independently 0.

5 10. A composition according to claim 1 wherein R_f is $CF_3CF_2O(CF_2O)_m-$, $(C_2F_4O)_pCF_2-$, $CF_3CF_2CF_2O(CF(CF_3)CF_2O)_pCF(CF_3)-$, $CF_3CF_2O(C_2F_4O)_pCF_2-$, $CF_3CF(CF_3)O-(CF(CF_3)CF_2O)_pCF(CF_3)-$, or combinations thereof, where an average value for m and p is 0 to 50 and m and p are not each independently 0.

10 11. A composition according to claim 1, wherein Q, Q' and Q" are independently $-(C_nH_{2n})-$, where n is 2 to 6, x is 0 and Y is a C_1 - C_4 alkoxy group.

12. A composition according to claim 1 wherein said component (b) is a compound of the formula:

$$(R')_q M(Y')_{p-q}$$

wherein R' is a non-hydrolysable group, M is an element selected from the group consisting of Si, Ti, Zr, B, Al, Ge, V, Pb, Sn and Zn, p is 2, 3 or 4, q is 0, 1 or 2, and Y' is a hydrolysable group.

13. A composition according to claim 11, wherein M is Si, Al, Ti or Zr; R' is a C₁-C₆ alkyl group; q is 0 or 1, and Y' is a C₁-C₄ alkoxy group.

14. A composition according to claim 1, wherein component (c) is a compound of the formula:

25 $R^m M(Y^m)_{3-x}$

wherein R" is a C₃-C₂₀ hydrocarbon group; M is an element selected from the group consisting of Si, Ti, Zr, B, Al, Ge, V, Pb, and Sn; Y" is a hydrolysable group, and x is 0 or 1.

30 15. A composition according to claim 14, wherein R" is a C₄-C₂₀ alkyl group; and M is Si.

16. A composition according to claim 1, wherein component (c) is a compound of the formula



wherein L is a reactive functional group selected from an amino, an epoxy, a mercaptan, a methacrylate and an anhydride group; Q'' is $-(C_nH_{2n})-$, where n is 2 to 6; M is an element selected from the group consisting of Si, Ti, Zr, B, Al, Ge, V, Pb, and Sn; Y'' is a hydrolysable group, and x is 0 or 1.

17. A composition according to claim 16, wherein M is Si and Y is a C_1 - C_4 alkoxy group.

18. A composition according to claim 1, wherein component (a) is present in an amount of between 1 wt-% and 50 wt-%; component (b) is present in an amount between 50 wt-% and 99 wt-%; and component (c) is present in an amount between 0 wt-% and 20 wt-%, the weight-% being based on the total weight of the components.

19. The composition according to claim 1, wherein said composition is derivable from a partial condensation reaction of components (a), (b) and (c).

20. The composition according to claim 1, wherein said composition is derivable from a complete condensation reaction of components (a), (b) and (c).

21. A process for preparing a partial or complete condensate comprising reacting components (a), (b) and (c) according to claim 1 in a polar organic solvent in the presence of water and an acid or base catalyst.

22. A method of treating a substrate comprising applying to at least part of a surface of said substrate a composition according to claim 1.

23. A coated substrate as prepared by the method according to claim 21.